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SCIENCE RESOURCES STUDIES HIGHLIGHTS

NATIONAL SCIENCE FOUNDATION WASHINGTON, D.C. 20550 FEBRUARY 20, 1980 NSF 80-303

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Federal Obligations to Universities and Colleges Continued Real Growth in FY 1978

By congressional mandate, the National Science Foundation (NSF) collects and analyzes data annually on Federal funds obligated to individual universities and colleges. The survey is directed to the 14 Federal agencies with the largest programs in support of academic science. These agencies accounted for over 99 percent of all Federal R&D obligations to universities and colleges and about 95 percent of all Federal obligations to academia for all purposes. Data for this survey were obtained in the second quarter of 1979, 6 to 8 months after the end of the fiscal year.

Highlights

- Federal R&D funding principally accounted for the 15-percent increase in total Federal obligations to universities and colleges in 1978. This increase, 8 percent in constant dollars, marks the third consecutive year of real growth. Growth in nonscience funds, which accounted for nearly three-fourths of the overall increase in Federal support to institutions of higher education between 1975 and 1977, slowed to 12 percent, accounting for about two-fifths of the 1978 increase in total support.

- A sharp rise in Federal R&D funds (15 percent) occurred as the National Institutes of Health (NIH) of the Department of Health, Education, and Welfare (HEW), increased its R&D allocations to academic institutions by 14 percent, accounting for more than two-fifths of the total growth in Federal academic R&D funding in 1978. Together, the Department of Defense (DOD) and the Department of Energy (DOE) accounted for most of the remainder, increasing their R&D funding $94 million, 11 percent of the total growth. An additional $148 million reflects the merger of two Navy federally funded research and development centers (FFRDC's) with their respective administering universities rather than an outright increase in R&D funding.

- Between 1975 and 1978, total Federal academic obligations increased an average of 11 percent per year in constant dollars compared to a 5-percent annual average growth between 1963 and 1975; the 1977-78 increase was 12 percent. The growth in the later period has had a marked impact on the concentration of funds among individual universities and colleges. The portion of total Federal obligations going to the leading 100 institutional recipients dropped from 87 percent in 1963 to 56 percent in 1978.

- Direct student support and instructional facilities and equipment showed gains of 11 percent and 50 percent, respectively, between 1977 and 1978, as did the "other science activities" category (3 percent). Obligations for R&D plant and general support for science declined slightly, by 6 percent and 2 percent, respectively (table 1).

Total Federal Support

Between 1975 and 1978 academic funding from Federal agencies grew at an annual rate of 11 percent in constant dollars, as compared to an essentially level phase between 1967 and 1975. Three-fifths of the 1975-78 growth in funding came from nonscience programs, primarily from Basic Educational Opportunity Grants (BEOG's) funded by the Office of Education (OE). In 1978, however, R&D funding led all other categories of Federal support in growth, increasing 15 percent

Table 1. Federal obligations to universities and colleges by type of activity

(Dollars in millions)

Type of activity	1975	1976	1977	1978
Total	$4,547	$5,403	$6,486	$7,479
Academic science	2,806	2,959	3,348	3,958
Research and development	2,239	2,423	2,785	3,362
R&D plant	45	24	36	34
Facilities and equipment for instruction	12	11	18	27
Fellowships, traineeships, and training grants	201	175	185	206
General support for science	46	74	76	74
Other science activities	262	252	248	255
Nonscience	1,741	2,443	3,138	3,522

Source: National Science Foundation.

(Prepared in the Universities and Nonprofit Institutions Studies Group, Division of Science Resources Studies)

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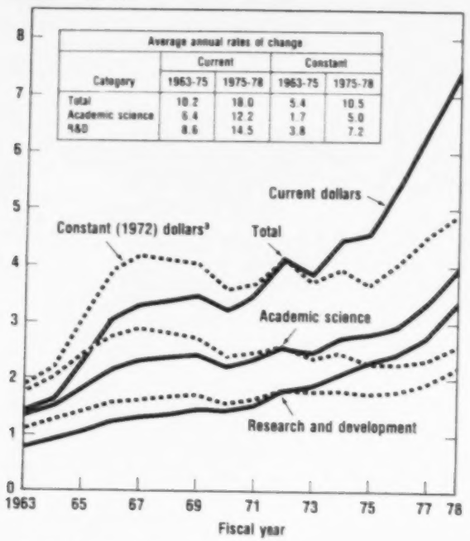
Chart 1. Federal obligations to universities and colleges by type of activity



[3]Based on the GNP implicit price deflator.

SOURCE: National Science Foundation

over 1977. An additional $148 million resulted from the merger of two former FFRDC's with their administering institutions. Even excluding these mergers, the 1978 R&D increase was the largest annual growth in Federal academic R&D funding recorded in this data series. It also represents the fourth largest increase in real growth—8 percent (chart 1).

The growth in Federal academic funding during the 1975-78 period impacted significantly on the distribution of Federal support among institutions of higher education. In 1963, when this survey series began, 87 percent of all Federal obligations to universities and colleges were concentrated among the leading 100 recipients of Federal funds. As Federal nonscience monies increased in the late sixties and early seventies, this ratio dropped to between 65 percent and 70 percent. Since 1976 the leading 100 recipients have accounted for 56 percent of total Federal academic funds. The wider distribution of funding in the latter period is largely the result of the introduction of large student-oriented programs, especially OE's BEOG program, which involved nearly all of the 2,700 institutions receiving Federal support. Funding for the BEOG program grew substantially from $166 million in 1975 for the support of 89,000 postsecondary students to a funding level of $2.1 billion in 1978 for 1.8 million students. The program was budgeted for an increase to $2.6 billion in 1979 to assist 2.7 million students.

The reclassification of the Applied Physics Laboratory (APL) from FFRDC status to a part of Johns Hopkins University raised Johns Hopkins to the position of the leading recipient of Federal support in 1978 from fifteenth in 1977. Its award total, $213 million, of which APL accounted for $136 million, was the largest funding level ever reported for a single institution. The Massachusetts Institute of Technology (MIT) ranked second with a total of $131 million. Howard University, which receives most of its operating revenues through the HEW budgetary process, dropped to third place in total receipts. Eight of the top 10 institutions in 1978 were similarly ranked in 1977 (table 2).

Academic Science Activities

Almost the entire 18-percent increase (11 percent in constant dollars) in Federal academic science funds was for research and development. The combined total for the other categories of academic science support for 1978 showed a small net increase of $33 million or 6 percent.

RESEARCH AND DEVELOPMENT

After discounting the effects of the reclassification of two former FFRDC's as integral components of their parent institutions, Federal support for academic research and development rose by 15 percent between 1977 and 1978, equal to 8 percent in constant dollars. The current-dollar growth rate is the third highest in the history of the survey series, exceeded only by the 19-percent growth between 1971 and 1972 and the 18-percent increase from 1963 to 1964, and is nearly two-thirds higher than the average annual rate of 9 percent for the 15-year period as a whole. Although all 14 surveyed agencies contributed to the increase, NIH alone was responsible for 43 percent. In relative terms, DOE showed the largest growth of any of the major agencies, 34 percent (partly attributable to the shift of some programs from other agencies). Even discounting the obligations to APL and the Applied Research Laboratory (ARL), obligations by DOD grew by 14 percent between 1977 and 1978. NSF, with 15 percent of all R&D obligations, was responsible for 8 percent of the 1977-78 increase.

R&D support increased within all areas of science in 1978, as it did in 1977, except for the residual category ("other sciences, not elsewhere classified"). The social sciences received the largest proportional increase, 38 percent over the 1977 amount, while engineering support, even excluding the funding for APL and ARL, was up 34 percent. While this raised the engineering share of the total R&D obligations from 9 percent to 15 percent, it had little effect on the overall distribution of funds among other fields (chart 2).

Academic research and development has historically been concentrated within a few large institutions. In 1963, at the beginning of the survey series, the leading 100 R&D-performing universities accounted for nearly 90 percent of all Federal support for research and

Table 2. Federal obligations to the 100 universities and colleges receiving the largest amounts:[1] FY 1978

(Dollars in thousands)

Rank	Institution (Ranked by total Federal obligations)	Total, all activities[2]	Research and development	R&D rank
	United States Total	7,479,177	3,362,174	
1	Johns Hopkins Univ	212,866	196,081	1
2	Mass Inst of Technology	130,586	114,021	2
3	Howard Univ	116,195	5,715	6
4	Univ of Washington	105,671	76,080	5
5	Univ of Wis-Madison	99,330	65,225	8
6	Univ of Cal-Los Angeles	97,779	69,595	6
7	Stanford Univ	94,009	80,110	3
8	Univ of Minnesota	93,558	59,582	10
9	Harvard Univ	89,949	68,520	7
10	Univ of Cal-San Diego	88,508	77,033	4
	Total 1st 10 institutions	1,128,451	811,962	
11	Univ of Michigan	86,527	58,444	11
12	Columbia Univ-Main Div	84,941	64,687	9
13	Cornell Univ	79,729	58,258	12
14	Univ of Pennsylvania	78,350	56,138	13
15	Yale Univ	67,892	53,805	14
16	Pennsylvania State Univ	66,767	41,974	20
17	Univ of Cal-Berkeley	65,720	49,663	15
18	Ohio State Univ	64,107	33,983	25
19	Univ of Chicago	61,262	48,984	16
20	Univ of Southern Cal	61,039	42,458	19
	Total 1st 20 institutions	1,844,785	1,320,356	
21	Univ of Cal-San Francisco	59,488	46,388	17
22	Univ of Ill-Urbana	58,840	42,947	18
23	New York Univ	54,905	38,235	22
24	Univ of Colorado	53,375	32,091	27
25	Washington Univ	52,162	41,974	21
26	Univ of Texas at Austin	47,701	37,232	23
27	Duke University	46,870	34,632	24
28	Univ of Rochester	46,653	33,616	26
29	Purdue Univ	44,383	29,554	28
30	Univ of NC at Chapel Hill	43,691	26,555	34
	Total 1st 30 institutions	2,352,853	1,683,560	
31	Michigan State Univ	43,666	21,792	42
32	Univ of Utah	42,863	29,352	29
33	Univ of Miami	41,713	25,744	38
34	Univ of Pittsburgh	41,319	25,984	36
35	Univ of Arizona	39,534	25,828	37
36	Univ of Florida	38,751	21,464	44
37	Univ of Cal-Davis	38,476	27,721	32
38	Northwestern Univ	38,401	26,635	33
39	Inter Am UPR-San German	37,894	0	
40	Univ Alabama-Birmingham	37,552	21,466	43
	Total 1st 40 institutions	2,753,022	1,909,566	
41	Univ of Iowa	37,326	24,371	40
42	Boston Univ	36,948	19,726	50
43	Yeshiva Univ	36,340	28,710	30
44	Univ of New Mexico	34,786	18,392	57
45	Case Western Reserve Univ	34,659	24,730	39
46	Texas A&M Univ	34,204	20,168	47
47	U Tennessee-Knoxville	33,329	18,462	56
48	Gallaudet College[3]	33,103	371	287
49	Rutgers the St Univ of NJ	32,552	13,537	71
50	Univ of Kentucky	31,988	11,921	80
	Total 1st 50 institutions	3,098,257	2,089,954	
51	California Inst of Tech	30,907	28,106	31
52	Univ of Missouri-Columbia	30,113	13,676	69
53	Baylor Col of Medicine	30,042	26,476	35
54	Colorado State Univ	29,017	20,371	46
55	Univ of Virginia	28,913	18,383	53
56	Univ of Md College Park	28,562	19,347	52
57	Louisiana State Univ	27,901	13,799	68
58	Univ of Mass at Amherst	27,876	10,602	87
59	Univ of Kansas	27,541	16,179	63
60	Oregon State Univ	27,462	18,532	55
	Total 1st 60 institutions	3,386,591	2,275,925	
61	Indiana Univ-Bloomington	26,383	10,949	86
62	Univ of Hawaii-Manoa	25,884	17,233	59
63	Temple Univ	25,845	12,559	76
64	Univ of Connecticut	25,526	14,923	65
65	Vanderbilt Univ	25,050	20,139	48
66	Georgia Institute of Tech	24,877	22,122	41
67	New Mexico State Univ	24,695	16,260	62
68	Univ of Md-Balt Prof Sch	23,467	16,592	61
69	Univ of Alaska-Fairbanks	23,424	20,133	49
70	NC State Univ at Raleigh	23,315	11,436	84
	Total 1st 70 institutions	3,635,057	2,438,271	
71	U Tex-Andrsn Hosp & Tumor I	23,301	21,213	45
72	Va Polytech Inst & St U	23,090	14,501	66
73	Univ of Georgia	22,876	14,180	67
74	Wayne State Univ	22,732	10,385	88
75	Univ of Cincinnati	22,631	13,362	72
76	Cuny Mt Sinai Sch of Med	22,317	18,868	54
77	U Tex Hlth Sci Ctr-Dallas	22,211	16,084	64
78	Washington State Univ	22,178	8,831	92
79	Woods Hole Ocngrphic Inst	21,465	19,621	51
80	Univ of VI & St Agric Col	21,090	12,059	79
	Total 1st 80 institutions	3,858,948	2,587,375	
81	Princeton Univ	20,721	16,759	60
82	Virginia Commonwith Univ	20,456	11,368	85
83	Florida State Univ	20,303	9,511	89
84	SUNY at Buffalo	20,187	13,155	73
85	Puerto Rico Jr Col	19,942	0	
86	Georgetown Univ	19,896	11,595	83
87	Univ of Ill Med Ctr Chgo	19,835	7,924	102
88	Univ of Oklahoma	19,459	7,347	106
89	City Colleges of Chicago	19,370	0	
90	Iowa St U of Sci & Tech	19,248	8,958	91
	Total 1st 90 institutions	4,058,365	2,673,992	
91	Oklahoma State Univ	18,926	8,181	98
92	Rockefeller Univ	18,868	17,473	58
93	George Washington Univ	18,842	13,003	74
94	Emory University	18,540	12,921	75
95	Mississippi State Univ	18,253	6,445	119
96	Auburn Univ	18,126	5,957	123
97	Carnegie Mellon Univ	17,699	13,569	70
98	Univ of Cal Irvine	17,624	11,861	81
99	West Virginia Univ	17,357	7,087	112
100	SUNY at Stony Brook	17,173	12,372	77
	Total 1st 100 institutions	4,239,803	2,782,861	

[1] Amounts shown represent awards to individual institutions. Awards to the administrative offices of university systems are excluded from institutional total because that allocation of funds is unknown but are included in "United States total."

[2] Amounts shown represent total obligations from 14 Federal agencies which accounted for over 95 percent of all Federal obligations to universities and colleges in the United States and for 99 percent of all Federal obligations for research and development to such institutions. These proportions may not apply to all individual institutions, some of which receive significant amounts of their funding from agencies not included in the survey, such as the Department of Justice, the Veterans' Administration, and the Smithsonian Institution. Agencies not surveyed accounted for about $15 million in R&D obligations.

[3] Howard University and Gallaudet College receive substantial appropriations from Congress each year for general operating expenses; their relative rankings thus reflect the magnitude of their nonscience programs.

SOURCE: National Science Foundation.

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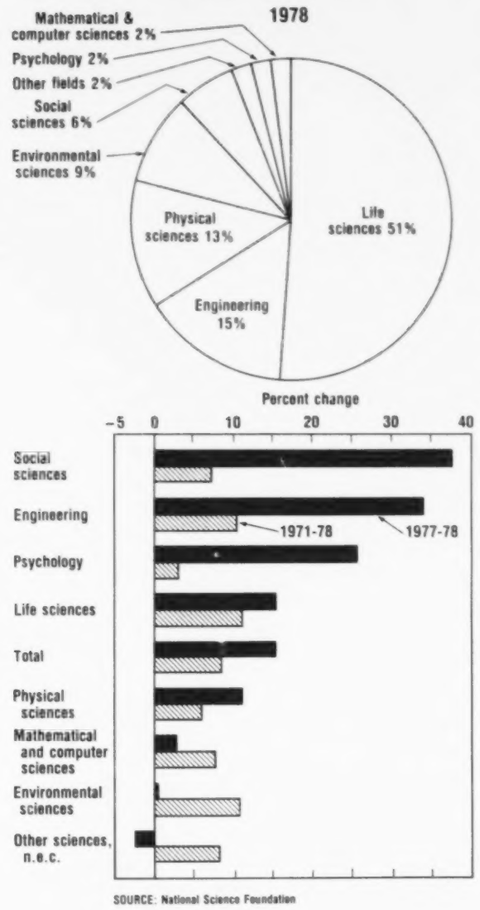
Chart 2: Federal R&D obligations to universities and colleges by field of science



SOURCE: National Science Foundation

development; by 1978 the leading 100 R&D performers continued to be recipients of 84 percent of all R&D funds. In contrast, the leading 100 recipients of total Federal obligations in 1978 received 56 percent of all Federal funds to universities and colleges.

Of the 674 institutions receiving Federal R&D support in 1978, the leading 20 recipients represented, as in previous years, about two-fifths of all such funds. Johns Hopkins University, the leading recipient of all Federal funding was also, for the first time, the leading R&D recipient, with $196 million. (All of the APL funds were for R&D activities.) MIT, the largest R&D recipient in previous years, was ranked second in 1978, with $114 million. With the exception of the replacement of Washington University by Pennsylvania State University (ranked 33rd in R&D receipts in 1977), there were no other changes among the group of the leading 20 research performers in 1978 from 1977.

Federal R&D funds are more highly concentrated among academic institutions than in either total Federal funding or in academic science support because R&D funds are awarded primarily on a merit basis. DOD concentrated 56 percent of its R&D support among the top 20 research performers, and of that amount, over one-half was received by APL. Three other Federal agencies funded over 40 percent of their R&D obligations to those 20 institutions—DOE, National Aeronautics and Space Administration, and NSF.

R&D PLANT

Federal funding for R&D plant was down by 6 percent in 1978 to a level of $34 million. In the preceding 10 years, 6 years showed decreases in Federal R&D plant funds to universities and colleges. The size of the decreases far outweighed that of the increases in the other 4 years. Support for R&D plant in 1978 remained at only about one-fourth the level funded for such activities during the midsixties. During 1963-67, academia witnessed unprecedented growth in research facilities and instrumentation and significant growth in support for Federal academic research activities. This growth accommodated large numbers of incoming graduate students. There are indications that this demand trend in R&D plant funding may be reversed in the future because support for academic R&D plant was scheduled to increase by 35 percent in 1979 in the President's Budget.

OTHER SCIENCE ACTIVITIES

Obligations from Federal agencies for all other science activities as a whole (including facilities and equipment for instruction; fellowships, traineeships, and training grants; and general support for science) rose by 7 percent in 1978 to $561 million. Funding for these programs increased for the second straight year, the first successive increase in over a decade. The level of funding for these programs, however, is still only about three-fourths of what it was at its peak in 1971, when the survey first obtained separate data on these activities. For the second successive year, support for fellows and trainees increased, this time by $21 million to a level of $206 million, the biggest absolute increase for this purpose since 1974. The number of full-time graduate students in doctorate-level institutions primarily supported by the Federal Government, in fact, has risen on the average by 3 percent per year since 1976, with the largest increases occurring in the health sciences supported by NIH funding.[2]

The 1978 level of funding for fellowships, traineeships, and training grants, however, was still only about one-half the $421 million funded in 1971. The proportion of those students primarily supported under Federal fellowships and traineeships dropped from 16 percent

in 1971 to 9 percent in 1977, the latest year for which data are available.[1] The decline was the result of the Federal Government's decision to deemphasize direct support of fellows and trainees in most Federal agencies in expectation of an abundant supply of Ph.D.'s in certain disciplines.

Federal support for facilities and equipment for instruction at universities and colleges (which came primarily from NSF) rose by nearly 50 percent, or by $9 million in 1978. This level of $27 million approximates, in current dollars, the same level of funding ($29 million) for this purpose in 1971.

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The final report, *Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1978*, including statistical tables presenting the survey findings in detail, will be released early in 1980.

Footnotes

Two former FFRDC's, Johns Hopkins University's Applied Physics Laboratory (receiving $136 million in R&D obligations in 1978) and Pennsylvania State University's Applied Research Laboratory (receiving $12 million) were reclassified in 1978 and became integral components of their parent institutions. Their funding, which was reported under university-administered FFRDC's for fiscal year 1977, was therefore included in the total obligated to universities and colleges for 1978.

National Science Foundation, *Academic Science: Graduate Enrollment and Support, Fall 1978* (Detailed Statistical Tables) (NSF 79-316), tables A-7 and A-12 (Washington, D.C., 1979.)

Ibid.

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